

Riparian and Agricultural ET Demand Study

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The Albuquerque Area Office staff and others have determined that there is a need for rapid improvement in measuring and predicting riparian water use in the Middle Rio Grande Basin. Also, although reliable “seasonal” agricultural water use estimates are available for some areas, evapotranspiration (ET) estimates for use in predicting daily crop water use requirements are presently not available. Methodologies will be developed for estimating these daily requirements at a resolution useful for implementation in the Upper Rio Grande Water Operations Model (URGWOM). The backbone of this model will be a daily water operations accounting tool, which will replace old methods that have become inadequate for today’s complex water management environment. One of the key goals of the interagency ET work group collaborative project is maximizing the attainment, interpretation, and use of agricultural and riparian evaporation and ET data for improved bosque and water management in the Middle Rio Grande Basin.

The objective for this project was to develop a NEXRAD (NEXt generation weather RADar) and Geographic Information System (GIS) based “ET Toolbox” for inputting daily riparian and crop water use estimates to the URGWOM, concentrating on the Middle Rio Grande from Cochiti Dam to Elephant Butte Reservoir. The work will include participation in a multi-agency evapotranspiration/evaporation team to develop better forecasting methods for estimating riparian corridor and agricultural consumptive use demands on a daily basis. The product will improve the water use estimates based on the findings from ongoing riparian and agricultural ET studies and guidance received from peer reviews by experts in this field.

Crop and riparian vegetation classification data from the 1992/93 Land Use Trend Analysis (LUTA) GIS Data Base were identified for each of the 4-km x 4-km National Weather Service (NWS) Hydrologic Rainfall Analysis Project grid cells. These data were combined with the ET estimates as calculated with a modified Penman equation to develop cell-by-cell water use estimates, adjusted for NEXRAD rainfall estimates, in acre-feet. Quantitative Precipitation Forecasts, available from the NWS West Gulf River Forecast Center (WGRFC), were implemented to enhance next-day rainfall estimations. Five “pop-up” ET Toolbox windows along the Rio Grande from Cochiti Dam to the northern boundary of the Bosque del Apache National Wildlife Refuge were designed (<http://www.usbr.gov/rsmg/nexrad>) to display the daily ET and NEXRAD rainfall estimates. Pop-up water use summaries were developed for defined river reaches and river diversion points, and special ET Toolbox files were generated and ported to the URGWOM. Computer specialists at the Corps of Engineers (COE) have begun development of the interface software to use these data in the URGWOM.

SCIENCE

And Technology Program



The NWS WGRFC has made their NEXRAD Stage III digital data files available to Reclamation via File Transfer Protocol (FTP), and personnel at the New Mexico Climate Center at the New Mexico State University (NMSU) have provided weather station data, also available via FTP. Additional weather station data are available from the Middle Rio Grande Conservancy District's (MRGCD) automated radio transmission system. NMSU resolved the LUTA GIS data to the 4-km x 4-km grid cells, and in cooperation with the University of Iowa, have provided crop and riparian coefficient data for calculating ET. Support from the COE, Fish and Wildlife Service (F&WS), and Reclamation offices in Albuquerque, New Mexico, and the Los Alamos National Laboratories (LANL), has been invaluable. There are a total of about 16 Federal and State partners involved in the program.

Personnel at Reclamation's Albuquerque Area Office, MRGCD, F&WS, and COE and others have used the results of the ET Toolbox to better manage water diversions to satisfy water use requirements in the Upper Rio Grande Basin. Results were discussed at an interagency ET work group meeting at the LANL in February 1999, and presentations were made at Reclamation's 4th biennial GIS conference in March 1999 and at various technology transfer conferences. Products resulting from this study are displayed on the NEXRAD World Wide Web page on the Internet (<http://www.usbr.gov/rsmg/nexrad>).

Publications include:

Brower, L.A., C.L. Hartzell, and S.P. Meyer. 2000. Evapotranspiration Toolbox for the Upper Rio Grande Water Operations Model. Preprints, 2nd Conference on Environmental Applications, 80th American Meteorological Society Annual Meeting, Long Beach, California, paper 5.8, January 9-14, 2000.